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The Uses of Stilboestrol Dipropionate in Cattle Practice

[SUMMARISED REPORT OF A MEETING HELD AT THE N.V.M.A. OFFICES ON DECEMBER 11TH, 1941]

The purpose of the meeting having been outlined, it was agreed to consider the use and value of stilboestrol dipropionate in the treatment of: (1) anoestrus in the heifer, (2) anoestrus in the cow where no corpus luteum had been detected, (3) anoestrus in the cow where a corpus luteum had been detected, (4) the retention of a mummified foetus or of foetal membranes, (5) pyometra where a corpus luteum had been detected, and (6) pyometra where no corpus luteum had been detected.

(1) THE TREATMENT OF ANOESTRUS IN THE HEIFER

It is common to encounter anoestrus in the heifer where a low nutritional level is associated with some degree of immaturity, and, particularly in the winter months, this failure to come into season may be explained by a generalised hypoplasia of the genitalia. Cases of this kind have been treated with stilboestrol dipropionate. Two types of evidence were presented; the first type where the measure of success had been judged only by the display of oestrus and acceptance of service, and the second, cases in which a detailed examination of the genital tract had preceded treatment and in which the subsequent ovarian changes had been recorded. Only the latter evidence need be considered in any attempt to determine the mode of action of the oestrogen. Cases have been followed from the stage before the injection of stilboestrol when the ovaries were smooth and immature, to the development of follicles and ovulation confirmed by the subsequent presence of corpora lutea in the follicle sites. One observer could also record three positive pregnancy diagnoses. The dose used, 10 mgm. intramuscularly for Channel breeds and 20 mgm. for larger cattle, seemed generally suitable and resulted in oestrus in 48-60 hours after injection: in some cases as late as the 120th hour. The incidence of ovulation at the first induced oestrus cannot be computed on the evidence available.

Much discussion centred round the level of response which could be expected in the heifer. It was contended by some that heifers in which stilboestrol induced heat and ovulation were animals which had just passed into the anoestrus state, or were just passing out of that phase, and that heifers which were in a 'dead' anoestrous state could respond only with a show of oestrus. Individuals who held these opinions attributed the successful matings at the first induced oestrus to the fact that stilboestrol had been used at the most favourable time, that is to say, prior to an impending ovulation. They postulated that during mid-winter, which is the period when 'dead' anoestrus is apt to occur, it would be difficult to induce a fertile oestrus by oestrogenic therapy. While there was agreement that a period of 'dead' anoestrus during which ovulation did not occur was a possibility to be met, a section of the meeting believed that oestrogen injections did not necessarily act solely as a 'trigger' mechanism, since they could not visualise in this 'trigger' action theory an adequate explanation of the ovulation in a hypoplastic ovary within 48 hours. They put forward the view that, in addition to the oestrogenic action on the genitalia, there was a direct stimulation of the anterior pituitary resulting in ovulation.

It was generally agreed that further clinical observations of the effects and sequelae of oestrogen therapy were essential and emphasis was laid on the fact that it was unwise to presume that absence of oestrus, following service at a stilboestrol induced oestrus, was evidence of pregnancy. It was advisable that the development of a follicle and the subsequent formation of a corpus luteum be determined by clinical examination, since in an unknown but probably high proportion of the cases, the induced oestrus would be unaccompanied by ovulation; but it was stated by some that in such cases normal oestrus would recur at the appropriate time, with ovulation and subsequent corpus luteum formation. (*Since the meeting it has been suggested that it would be advisable to withhold service at the induced oestrus and to allow service at the following normal 'heat,' should this occur, thus avoiding the necessity for repeated clinical examination.*)

To summarise, while a divergence of opinion as to the mode of action of stilboestrol existed, there was unanimity as to its use. Thus, before the final place of stilboestrol in the treatment of anoestrus in the heifer could be assessed, much more evidence of a detailed nature was needed.

(2) THE TREATMENT OF ANOESTRUS IN THE COW WHERE NO CORPUS LUTEUM HAD BEEN DETECTED

There was little discussion on the above which is met with chiefly in cows in poor condition, particularly in the winter months. However, it seemed that a condition of general hypoplasia was frequently met and that 'silent heat' was well recognised. The condition might well be treated on the same lines as anoestrus in the heifer. It was recognised that anoestrus in the cow, in the absence of a corpus luteum, might follow pathological changes in the ovary. Where there is no corpus luteum, oestrogens should only be exhibited where hypoplastic conditions can readily be determined.

The well recognised clinical entity, nymphomania, is associated with pathological changes in the ovary and exemplifies the type of condition in which the use of oestrogens is contra-indicated.

(3) THE TREATMENT OF ANOESTRUS IN THE COW WHERE A CORPUS LUTEUM HAD BEEN DETECTED.

There was general agreement that in those cases stilboestrol dipropionate, in doses similar to those suggested for the heifer, had given satisfactory results. Regression of the corpus luteum, heat and ovulation had been observed. It was agreed that return to oestrus could be induced by the expression of the corpus luteum, but it was pointed out that in some cases it is not possible to express a corpus luteum which has become embedded. It was also contended by some that this operation was not unattended by a degree of danger. The raising of the oestrogen level is the physiological means of effecting regression of the corpus luteum.

In the view of the majority attending the meeting, the incidence of a persistent corpus luteum is not high. The mere finding of a corpus luteum did not indicate 'persistence'; repeated examination over a period of 21 days would be necessary to determine 'persistence.' It seemed more probable that hypofunction of the ovary in one normal cycle, resulting in only 'silent heat' is frequently confused with anoestrus due to a persistent corpus luteum. The fact that heat followed the expression of a corpus luteum proved the obvious—that it had been present and expressed; not that it had been persistent.

(4) THE TREATMENT OF RETENTION OF A MUMMIFIED FOETUS OR OF FOETAL MEMBRANES

Well documented evidence was presented on a few cases in which the expulsion of a retained mummified foetus had been accomplished by the injection of stilboestrol diproprionate. The intramuscular injection of 25 mgm. caused the onset of oestrus within 24 hours and the expulsion of the foetus and membranes between the third and sixth day. Where there was doubt as to the ability of the potentiated uterus to contract sufficiently to expel the foetus, posterior pituitary lobe extract had been used. Experience may show that its use is unnecessary.

The mechanism underlying the expulsion of a mummified foetus is in no way different from that arising in the expulsion of any foreign body in the uterus. Retained foetal membranes may justifiably be regarded as a foreign body. This line of thought led one observer to utilise the injection of stilboestrol dipropionate at a 25 mgm. dose to treat retention of foetal membranes. He reported that in three successive cases stilboestrol was injected 24 hours after parturition. The placentae came away 24 hours subsequent to the injection with involution of the uterus. Two out of the three cows were apparently in

oestrus in 24 hours. Obviously it would be premature to draw conclusions on the use of stilboestrol from such a limited number of cases.

(5) The Treatment of Pyometra where a Corpus Luteum had been detected

Stilboestrol was suggested in this condition because of its ability to potentiate the uterus and lead to a scrapping of dead tissue accompanied by increased vascularisation and leucocyte infiltration. At the same time regression of the corpus luteum would occur, and regular cycles be initiated. To achieve this a high local concentration of oestrogen was aimed at by direct intra-uterine injection of stilboestrol in oil. Results were favourable but it appeared that much of the injection was voided with the first discharge. In these circumstances the intramuscular route appeared less troublesome and likely to achieve the desired result.

Several observers were able to report a very satisfactory outcome from their use of stilboestrol in this condition. Some had described the outpouring of pus as little short of spectacular. In some cases, treated cows were now reported to be in-calf. It was suggested that in some cases it would be advisable to prepare the uterus by syphoning off the pus, treat with oestrogen, and finally irrigate the uterus with a weak iodine solution. These discussions led to a consideration of the possibility that certain of the sulphonamides may find a useful place in local application combined with the use of oestrogen. The dose is 25 mgm. stilboestrol diproprionate.

(6) The Treatment of Pyometra where no Corpus Luteum had been detected

It was appreciated that the considerations set out in (2) above applied equally in this case, and that the same caution was necessary in the selection of cases for treatment with stilboestrol.

GENERAL CONCLUSIONS

It was accepted that in stilboestrol dipropionate the veterinary profession has at hand a highly potent oestrogen. The consensus of opinion was that this product has an important place as a clinical weapon in the treatment of certain well-defined disorders of the ovario-uterine tract in cattle. The field of work reviewed indicated the necessity for careful clinical study and the selection of suitable cases in order that further accurate information be obtained on the use of this compound.

There is a danger that widespread use of this potent oestrogen may lead to indiscriminate use. It must be obvious that this compound can only be properly used after a careful clinical examination has revealed conditions which justify its employment. For the present it can only be recommended for cautious use as indicated in this report.

Members who attended the meeting undertook to keep careful clinical records of their cases, and it is hoped that others who make use of stilboestrol dipropionate in practice will follow this example so that a volume of evidence will quickly be built up defining the uses and limitations of this product.

SPORT IN WAR-TIME

In his House of Commons speech on February 25th Sir Stafford Cripps said that steps would be taken to see that activities which are completely out of accord with the true spirit of the nation at this time—among which activities he included dog racing and boxing displays—would no longer be allowed " to offend the solid and serious intention of the country to achieve victory." The detailed application of this principle is now being considered by the War Cabinet in consultation with the Departmental Ministers concerned.

After Sir Stafford Cripps had ended his speech in the House Mr. Austin Hopkinson commented on the fact that he had not referred to horse racing, and asked whether that was an intentional omission. Sir Stafford Cripps indicated dissent and explained that he had referred to dog racing and boxing displays as " two illustrative examples of a general principle."

In deciding what further restrictions on sporting events may be necessary the War Cabinet will take account of the views of the Minister of Labour, the Home Secretary and the Minister of War Transport. Apart from Departmental considerations the Cabinet will also have to weigh the argument—which has always had much authoritative support in the Government—that war workers in their periods of leisure must have reasonable facilities for relaxation.

The Physiological Basis for the Use of Oestrogens in Veterinary Practice*

I.—The Clinical Application of Stilboestrol Dipropionate

G. BROWNLEE,

Wellcome Physiological Research Laboratories, Beckenham

The successful use of oestrogens in the treatment of anoestrus in domestic animals dates from 1934 when Steinach published details of the treatment of cows, heifers and pigs with oestradiol monobenzoate. Since then the observations have been repeated at intervals, the latest publication being that of Folley and Malpress, but the systematic use of oestradiol esters has been hindered by the lack of material at an economic price. Fortunately the synthetic oestrogen dihydroxydiethylstilbene, named stilboestrol for convenience, which was introduced by Dodds and his colleagues, provided research workers with a potent oestrogen which could be produced cheaply. Subsequent human trial has proved the compound safe in use.

During the past two years Dr. Montgomerie and I arranged limited trials in various parts of the country. The bulk of the observations on cows and heifers have been made by Mr. G. N. Gould, M.R.C.V.S., of Southampton, and by Mr. S. L. Hignett, B.SC., M.R.C.V.S., of Leeds University, to whom we are much indebted. A note of these observations by Montgomerie and Brownlee has already been made in *The Veterinary Record*. We started this investigation with the idea that oestrogens would cause a sterile heat which would initiate a succession of normal cycles. It was soon evident that a much more important role was being played by the injected oestrogen. The reports showed, and Mr. Gould has to-day emphasised this point, that a single intramuscular injection of stilboestrol dipropionate usually results in heat with ovulation in the anoestrus heifer. Ovulation in the heifer following oestrogen therapy occurred during the normal breeding season. It has still to be shown whether ovulation can be induced during the winter months. Further evidence, of the kind which Mr. Stuart has underlined to-day, made it clear that the injection of a suitable dose of oestrogen results in an immediate regression of any functional corpus luteum which may be present in the ovary. It can be said of the three types of case history you have heard this afternoon—the treatment of anoestrus, the treatment of pyometra, and the treatment of a retained mummified foetus—that they have this point in common, the domination of the uterus, ovary and pituitary by a corpus luteum. A functional corpus luteum is a temporary endocrine organ ; when it achieves permanence in the absence of pregnancy, pathological conditions intervene.

As a result of the observations of Gould, Hignett, Stuart and others, Dr. Montgomerie and I have found it convenient to outline a hypothesis which would cover the known observations on a normal ovarian cycle in the cow. This hypothesis differs from the accepted picture in detail and it may prove to be inaccurate. It well serves its purpose if it proves to be provocative.

The oestrous cycle in the cow measured from oestrus to oestrus occupies 21 days and is conveniently described in terms of 12 days metoestrus followed by 6 days dioestrus and 3 days pro-oestrus. At the beginning of metoestrus, oestrus or " heat " has just occurred and ovulation takes place within the next 24 hours. During the next 6 or 7 days the concentration of progesterone in the blood rises to a " plateau " as a result of the corpus luteum which arose in the ruptured follicle. During this metoestrus the corpus luteum is supreme and the uterus is dominated by progesterone ; it is quiescent and shows no rhythmic contractions due to posterior pituitary oxytocin. (A clinical examination of the uterus of the cow at this stage shows an organ which is at first quite placid and only on handling will tone be gradually built up until it resembles the condition found in oestrus where the uterus has not been handled. A uterus which will not develop turgor on handling should be suspected of disease, *e.g.*, metritis).

By the eighth day of metoestrus the oestrogen blood level is again rising due to developing follicular tissue, and this level

* Communications made to the meeting of the South Eastern Veterinary Association held at Tunbridge Wells, October 30th, 1941.

is high enough by the twelfth day, the beginning of dioestrus, to cause the corpus luteum to regress. As a result the oestrogenic phase is predominant by the eighteenth day and the changes in the uterus associated with pro-oestrus are seen. In consequence, the uterus is potentiated to oxytocin and rhythmic contractions are observed. We believe the rise in blood-oestrogen level to have two direct results, one, the regression of the functional corpus luteum with the results just described, and two, the direct stimulation of the anterior pituitary. The effect of this stimulation is that two gonadotrophic hormones are secreted —follicle stimulating hormone which causes development of a follicle, and luteinising hormone which causes its rupture, setting free an egg and converting the follicle into a corpus luteum.

Should this thesis be found acceptable it follows that the oestrogen secreted by the ovary is the controlling mechanism in the endocrine cycle.

It now becomes clear that in the treatment of such cases of anoestrus as have been described by Mr. Gould to-day, a precise dose of stilboestrol dipropionate is needed in order to duplicate the " plateau " level achieved by the animal's ovaries. Thus the weight of the animal is important and the functional condition of its ovaries should not be overlooked. As a guide 10 mgm. has been found suitable for Guernsey types and 20 mgm. for Shorthorns.

Before referring to Mr. Stuart's cases it is instructive to relate one ovarian cycle to the period of gestation.

Since the fertilised ovum (blastocyst) can only be nurtured in the progesterogenic epithelium of the uterus it is worth while observing the mechanism of timing at this stage. When the egg is set free no functional corpus luteum is in existence and a few days must elapse before the new corpus can achieve a progesterone blood level necessary to cause the essential uterine changes for embedding the blastocyst. However (or because of this ?) the tortuous passage of the ovum down the Fallopian tube may take three to five days before the lower end is reached where fertilisation may take place should a spermatozoon be waiting. Should fertilisation take place the corpus luteum persists, due, it is considered, to the reaction of the mechanism of attaching the fertilised ovum to the endometrium. On the face of it, it would seem that we now have an efficient mechanism for maintaining the foetus in the uterus for all time. Presently, however, the placenta takes up the duty of producing oestrogen and at term this rising tide reaches a level high enough to tip the balance causing the corpus luteum of pregnancy to regress. As a result the uterus is potentiated by the oestrogen and is now subject to posterior pituitary oxytocin, causing the rhythmic contractions which result in parturition.

It is worth observing that should the placenta die the oestrogenic level necessary to cause the mechanism of birth will never be reached and the foetus will be retained. This, I suggest, is the operative mechanism in the two cases described by Mr. Stuart. In both cases I believe the cow had aborted some months before the first examination. The presence of the foetus in the uterus, acting as a deciduoma, maintained the corpus luteum, while the corpus luteum maintained the uterine contents.

The logical treatment to break this pathological cycle was the normal physiological mechanism—to raise the blood oestrogen level to that stage at which the corpus luteum regresses. This was done by injecting 25 mgm. of stilboestrol dipropionate and the potentiated uterus which resulted was stimulated into rhythmic contractions by injecting posterior lobe pituitary. This latter follow-on was in the nature of a precautionary measure in case the animal's own circulating oxytocin should prove inadequate. Mr. Stuart's second case would seem to show that these fears were groundless and that the oxytocin could be dispensed with. Only further cases will show which course should be followed in practice.

Viewed from the point of view of this discussion it will now be evident that the condition of pyometra is not different from that of a retained mummified foetus. A deciduoma is again present, this time in the shape of pus. The object of the treatment is the same and the course identical. When this treatment was first proposed it seemed wise to attempt a high local concentration of oestrogen and therefore the intrauterine route was chosen. It may prove to be the case, as Mr. Gould has indicated, that the much less troublesome intramuscular route can be used with equal success. It is perhaps worth observing that the pyometra is the result of an abnormal physiological state and not the cause. When, therefore, the potentiated oestrogenic uterus has thrown out the mass of pus the normal oestrous cycle which will then intervene may be confidently expected to deal with any remaining pus. I consider the leucocyte invasion of dioestrus and pro-oestrus, followed as it is by what has been called " the electrolyte and serous leak " at oestrus, to be the organism's most efficient way of dealing with bacterial invasion.

Enough has now been said to show that a base exists from which temporary infertility in domestic animals can be attacked. It must be said that stilboestrol dipropionate is a potent compound capable of stimulating the anterior pituitary in small doses and inhibiting it in large doses. It should be used only after searching clinical examination. It should be appreciated, for example, that while 10 mgm. may prove a suitable dose for a cow it is a ten times over-dose for the sheep and goat. The compound has been used in the cow to produce abortion, but enormous doses for prolonged periods were needed.

In conclusion it should be said that these observations are only possible because of the painstaking clinical work of Mr. Gould, Mr. Hignett, Mr. Stuart and many others.

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II.—The Use of Stilboestrol in the Field

G. N. GOULD, M.R.C.V.S.,
SOUTHAMPTON

The synthetic oestrogenic product, stilboestrol dipropionate, is, in my experience, a valuable addition to veterinary therapeutics. Its use is indicated in anoestral conditions. In many such cases the ovaries are small, smooth and hard and show no evidence of Graäfian follicles or corpora lutea. The condition is common during and after a period of winter feeding, particularly in heifers wintered out and in low condition.

In my experience of this product it has given satisfactory results and has proved superior to any other preparation used. For Guernsey type heifers I use 10 mgm. intramuscularly; for strong Shorthorn type heifers, 20 mgm. Oestrus usually becomes evident within six days but sometimes as late as eleven days. Service should be delayed until recurrence of oestrus in three weeks to ensure that ovulation is occurring. In six recent cases checked by rectal examination it was found that in five the ovaries contained corpora lutea ten days after oestrus was manifested, indicating that ovulation had occurred. In one this was not found, the injection appearing to act as a " trigger " mechanism inducing symptoms of oestrus without ovulation.

I am of the opinion that the use of this product should be preceded by a careful clinical examination to determine that the animal is not pregnant. I am not at all convinced, in spite of Dr. Brownlee's most convincing arguments, that such a potent oestrogenic product may not be capable of inducing abortion in a pregnant animal. The experiences of Stuart, which you will hear later, in bringing about delivery of mummified calves by the use of this product, tend, in my opinion, to support this view.

This product has proved more satisfactory in my hands than gonadotrophic hormone preparations.

I have also used the product in the treatment of pyometra—both non-specific and that due to trichomonas infection—with very satisfactory results. At Dr. Brownlee's suggestion, I gave the product as an intrauterine injection, giving 20 mgm. in 20 c.c. This was followed in a day or two by a very copious discharge which persisted and was associated with a gradual diminution in the size of the uterus, followed by onset of oestrus in about four weeks, after which the uterus appeared to be of normal size. These cows were ones in which a corpus luteum could not be extruded from the ovary. I am at present trying the preparation intramuscularly in the same type of case with satisfactory results, giving 25 milligram doses. There is no doubt that in such cases the use of this product can and will enable more satisfactory and rapid results to be achieved. The treatment can be combined with Lugol's irrigation if desired.

I understand that to obtain the best results with this product the correst dosage is important. Dr. Brownlee will probably enlarge upon this point.

Once again I must tender my thanks to Dr. Brownlee for his help and suggestions during the initial stages of clinical trial and to the Wellcome Laboratories for supplying stilboestrol dipropionate in generous quantities.

III.—Two Cases of Mummified Foetus treated with Stilboestrol

K. STUART, M.R.C.V.S.,
HAYWARDS HEATH

CASE NO. 1

The subject was a Guernsey cow, aged six years, carrying her third calf. In her first pregnancy she produced a full-time mummified foetus and the calf of her second pregnancy, produced at full time, died in a fit when a few days old. The service date of this third pregnancy was October 8th, 1940.

I was asked to examine the cow on July 19th, 1941. She was obviously in calf, the uterus being drawn down over the brim of the pelvis. That portion of the organ which could be palpated was enlarged but neither cotyledons nor foetus could be palpated. A corpus luteum was present in the right ovary but it was too deeply embedded to be easily expressed. Pulsation could be felt in the left middle uterine artery but appeared to be weak; no pulsation could be felt in the right artery. A firm uterine seal was present.

On August 8th a much greater part of the uterus could be palpated and a mummified foetus was present in the left horn. The corpus luteum in the right ovary could not be expressed.

On September 4th examination revealed little change during the past month. A determined attempt to express the corpus luteum failed.

It was at this point that I had the advantage of discussing the case with Mr. Gould, of Southampton, and at his suggestion got into touch with the workers at the Wellcome Physiological Research Laboratories. The line of treatment which they suggested was followed and on September 10th 25 mgm. of stilboestrol in oil was injected intramuscularly at about 4 p.m. On September 12th, at 7 p.m., there was a semi-fluid, chocolate coloured discharge at the vulva, a small portion of foetal membrane extended through the os into the vagina and the os had dilated sufficiently to admit two fingers. Posterior pituitary extract was then injected subcutaneously; 8 c.c. of material containing 10 units per c.c. At 5 a.m. on September 13th it was found that the foetus completely enclosed in the foetal membranes had been expelled during the night. The mass was about 2 feet long and 11 ounces in weight, the foetus itself being 6 inches long. On September 18th oestrus appeared. The corpus luteum could no longer be palpated in the right ovary and ovulation appeared to be occurring in the left.

CASE NO. 2

This cross-bred Shorthorn-Guernsey was purchased in the autumn of 1939 as a heifer which had just had her second calf. She was served on November 2nd, 1940, and I was asked to examine her on October 6th, 1941, when she was eight weeks overdue. There was little difficulty in determining the presence of a mummified foetus.

On October 9th, 25 mgm. of stilboestrol in oil was injected intramuscularly at about 6 p.m. Examination on the following evening showed that the vulva was enlarged and flaccid. There was a slight discharge of clear mucus, but although the vagina was quite moist no alteration could be detected in the *os uteri*. On the following day the owner reported that the vulva had returned to its normal appearance.

At 7 a.m. on October 15th the animal appeared to be in oestrus and was allowing other cows to mount her. The owner noticed that a semi-fluid, chocolate coloured vaginal discharge was present. I examined the animal at 2 p.m. on that day and found the foetus enclosed in its foetal membranes in the vagina. It was delivered without difficulty and was typically mummified, measuring 20 inches from the poll to the base of the tail and, with its foetal membranes, weighed 7 lbs.

In neither case did lactation follow the expulsion of the foetus.

The Government's intention is to secure the most appropriate development and use of the land. They believe that there can be welded into a single and consistent policy post-war reconstruction including the speedy provision of houses for those who need them, the redevelopment of devastated areas, the clearance of slums, the relief of over-crowding, the provision of all necessary public services, and the general promotion of rural development in the light of a positive policy for the maintenance of a healthy and well balanced agriculture.—*Mr. Arthur Greenwood.*

The Use of Staphylococcal Toxoid in the Field*

G. N. GOULD, M.R.C.V.S.,
SOUTHAMPTON

These notes are written very early in a clinical investigation of staphylococcal mastitis in the lactating cow with a view to stimulating members of the profession to record their experience in the diagnosis and treatment of this condition.

If it be accepted that acute staphylococcal mastitis is the common gangrenous type which has such severe and often fatal sequelae, the type of staphylococcal mastitis covered by this report must be referred to as sub-acute.

This would be in accordance with the symptoms exhibited, since, although the constitutional symptoms, as evidenced by loss of appetite and depression, are more marked than in most cases of streptococcal mastitis, the temperature is rarely so high and respiration is unaffected. Local symptoms in the udder are less acute than in acute streptococcal mastitis, in which a swollen, hot, painful quarter is a constant symptom.

My interest in sub-acute staphylococcal mastitis was first aroused when I found that cases exhibiting certain symptoms did not respond to either sulphanilamide or acriflavine therapy. Samples were from time to time submitted to a laboratory and the invariable report was staphylococcal infection.

DIAGNOSIS.—It is accepted by the writer that bacteriological diagnosis is the only certain method, but since successful treatment of mastitis demands that it must not be delayed, it is essential that the practitioner be able to give a good diagnosis on the farm.

Sub-acute staphylococcal mastitis is most commonly met in the recently-calved cow; it has not been met in cows which have been in milk more than two months. Constitutional symptoms in varying degree are noticed, their severity depending very largely on the interval which has elapsed since parturition; the nearer parturition the more severe. A rise in temperature to 103·5° is regularly noted and to 105° F. in some of the more severe cases occurring shortly after parturition. A marked feature in all cases is the loss of appetite and the depression exhibited by the patient. The appearance of the udder is characteristic for there is almost constantly present a prominent subcutaneous wheal from the back of the udder down to the base of the teat. It varies in width, depending on the severity of the condition, but is usually 2 to 3 inches broad. The only cases I have experienced in which the front quarter has been involved have also been affected in the hindquarter of the same side and had a front-quarter wheal forward beyond the base of the teat. On palpation of the quarter there is a typical induration radiating from the base of the teat and perhaps best described as a "cording" within the udder tissue around the galactopherous sinus. In cases occurring later in lactation this "cording" is present but the subcutaneous wheal and the more severe constitutional symptoms may be absent. The affected quarter has an odd, lop-sided appearance, like a bag weighted at the bottom. Palpation of the udder conveys a similar impression. The milk secretion is almost characteristic, for it has the appearance of a dirty grey, thin syrup with minute clots which appear to impart the colour to the secretion. The "cording" of the udder tissue radiating from the base of the teat, or "corded" induration confined to the dependent parts of the quarter, is typical of this infection.

Acute *Str. agalactiae* infection of the recently calved cow gives rise to a subcutaneous oedema over the general surface of the quarter or quarters involved and is not in the form of a subcutaneous wheal. The induration of the affected quarter is also general and equable and not limited to the dependent parts of the affected quarter or quarters. It is not "corded." The type of secretion is known to you all—large clots in a whey-like yellowish or orange fluid is the most common in acute cases.

In sub-acute *agalactiae* infection induration is, admittedly, often confined to the lower third of the quarter, but "cording" is only met with when it is a flare up of a chronic infection, in which case the quarter is usually "short." The quarter in such cases gives a different impression from that described above and does not appear weighted.

The character of the milk in such cases is typical of strepto-

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coccal infection—as opposed to the dirty grey, thin, syrupy secretion of sub-acute staphylococcal infection.

Mixed infections do occur, and are indicated by the predominating clinical features of staphylococcal infection described above with a secretion tending to resemble the *Str. agalactiae* infection in character.

The clinical diagnosis has been checked in a number of cases by forwarding to the Wellcome Laboratories samples of secretion with an accompanying note of the diagnosis. While a far larger number have been successfully treated on a clinical diagnosis alone, the laboratory findings have regularly confirmed the field opinion; even mixed "staph.-strept." diagnoses.

Treatment.—Until relatively recently I have had little success in the treatment of staphylococcal mastitis. Dr. R. F. Montgomerie suggested that staphylococcus toxoid might prove of value and the Wellcome Laboratories made ample supplies available for clinical trial. Different dose levels and intervals between injections were used during the earlier stages of this trial. I am tentatively of the opinion that the initial dose, given as early as possible, should be 10 c.c. and followed up by doses of 10 c.c., 15 c.c. and 20 c.c. at intervals of two or three days. The injections have been by the intramuscular route.

This toxoid treatment has exceeded expectations and is, in fact, the only one which has given me any success. Previously such quarters had never recovered—the "cording" persisted, the secretion remained abnormal and finally the quarter dried and markedly atrophied. At subsequent lactation a recrudescence of symptoms occurred or the quarter was completely lost. While treatment has, of course, been accompanied by the usual adjuvants, the most important of which is frequent milking, the results have often been quite spectacular.

In some of the more severe cases within 18 to 24 hours of the first injection the constitutional symptoms have almost disappeared, the wheal considerably diminished and the secretion almost returned to the appearance of milk.

In the majority of cases the recovery is gradual, the return of the secretion to the appearance of milk is usual within seven to ten days, and while the yield from recovered quarters has been reduced there has been, so far, no recurrence of symptoms. "Cording" persists (though it is appreciably diminished) even after the return of the secretion to the normal, and tends gradually to diminish over a period of weeks, but in cases in which it was marked at the commencement of treatment localised "cording" may persist indefinitely. In mixed infections toxoid treatment has been satisfactorily combined both with sulphanilamide and acriflavine therapy and has given equally satisfactory results.

While I readily agree that much further experience is necessary before the value of toxoid can be fully assessed, I believe that sub-acute staphylococcal mastitis of the lactating cow can be diagnosed on clinical grounds and that the early injection of toxoid is a promising line of treatment.

I wish to acknowledge the assistance of Dr. R. F. Montgomerie in the examination of milk samples and arranging the provision of supplies of staphylococcal toxoid prepared by the Wellcome Laboratories at Beckenham.

REPORT

[THE HANNAH DAIRY RESEARCH INSTITUTE. Twelfth Annual Report: Year ending March 31st, 1941.]

This review of the work of the institute for the twelve months ending March 31st, 1941, reveals an intensification of activity with a strong bias towards problems of war-time importance. The possibilities and benefits of improving grassland have been adequately demonstrated. Amongst the benefits was an excellent yield of grass silage: incidentally, the institute has played a large part in popularising silage making in this country.

In a search for substitute protein foods, tests carried out indicated that urea could be fed to the extent of one-third the total protein in the ration over a period of six weeks without detriment to milking cows. Other problems relate to the condition of storage of dried milk products—which keep well in the presence of inert gases—and dried grass, concentrate cakes, etc., which seem to deteriorate if the relative humidity exceeds 67 per cent. Extensive work has also been carried out in connection with the diagnosis of mastitis and contagious abortion, together with a variety of more purely dairying problems, the sum total of the results making a valuable contribution to knowledge.

REVIEW

[VETERINARY ANAESTHESIA. By John G. Wright, F.R.C.V.S. Pp. viii and 207. 56 illustrations. 7 plates. Baillière, Tindall & Cox, London. Price 10/6.]

We are pleased to welcome this up-to-date treatise on Veterinary Anaesthesia by an author so competent to deal with the subject as Professor J. G. Wright. It will be found most useful to veterinary surgeons and students alike.

In the opening chapter the author gives an excellent description of the general considerations of the broad subject of anaesthesia in animals and the types of anaesthesia available. In a very convincing manner he indicates the greater difficulties that confront the veterinary anaesthetist than his confrère engaged in human surgery.

The author then proceeds in succeeding chapters to deal with his subject in its various applications, commencing with local, regional and epidural anaesthesia, noting the indications, procedure and technique in each case. The chapters on narcosis, regarded here as a form of partial anaesthesia, consider the uses of chloral hydrate, cannabis indica and morphine. Incidentally, an interesting description is given of the use of the stomach tube in pigs for the administration of chloral hydrate by Juhl's method. This may be found to be of great service by practitioners for other purposes besides the administration of chloral. The chapter on the use of tincture of cannabis indica by the intravenous route in the horse makes very interesting reading, and although a series of very favourable cases is detailed, the author hesitates to recommend it owing to the occurrence of mania lasting for several days in one of his cases which confirmed the experience of Muir in America.

General anaesthesia is considered under the two main headings of volatile anaesthetics (inhalation anaesthesia) and non-volatile anaesthetics. Of the former chloroform and ether are dealt with but there is no mention of nitrous oxide. Of the non-volatile anaesthetics the barbiturates (nembutal, Evipan sodium, Narcosol, Pentothal sodium) and Avertin (Bromethol) are considered in some detail. The author has had unique opportunities to use these agents in the Clinique of the Royal Veterinary College, London, and is largely responsible for popularising their use in Great Britain. His very lucid exposition of this aspect of anaesthesia is obviously the work of a master of his subject.

Throughout the book detailed attention has been paid to dosages of the various agents used and to such antidotal measures as are available should they become necessary.

For useful reference The Animals (Anaesthetics) Act, 1919, is reproduced as an appendix, and we agree with the author's view that it is in urgent need of revision.

The numerous illustrations are on the whole excellent, though a student might be excused for asking which hand is supposed to be raising the jugular vein of the horse in Fig. 32, while Plate V is a delightful photograph of hands and arms (six in all) of operator and assistants. The Publishers work is all that can be desired—Messrs. Baillière, Tindall & Cox are to be complimented on producing the book in these difficult times.

ABSTRACT

[EFFECT OF HUMAN STRAINS OF *HAEMOPHILUS INFLUENZAE* ON INFLUENZA VIRUS INFECTIONS OF SWINE. Mote, J. R., and Fothergill, Le R. D. (1940.) *J. Bact.* **40**. 505-516.]

It has previously been shown by Shope and by other workers that pigs are susceptible to laboratory strains of human influenza virus, and that simultaneous administration of *Haemophilus influenzae suis* leads to the development of a syndrome which is indistinguishable from epizoötic swine influenza. In view of the much-discussed relationship between human and swine influenzas, the authors decided to test the pathogenicity for 8- to 12-weeks-old pigs of swine influenza virus plus human strains of *H. influenzae*.

Two strains of swine influenza virus and seven human meningeal strains of *H. influenzae* were used, but the results failed to indicate any significant clinical or pathological difference between animals so treated and control pigs which had received swine influenza virus alone. None of the human strains of *H. influenzae* appeared to be capable of establishing itself in the respiratory tract of the pigs. A. N. W.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Mar. 7th.—Meeting of the Society of Women Veterinary Surgeons, at Liverpool, 2.30 p.m.
Mar. 12th.—N.V.M.A. Committee Meetings at 36, Gordon Square, W.C.1: Consultative, 11.30 a.m.; Finance and General Purposes, 2.15 p.m.
Mar. 13th.—Annual General Meeting of the South Wales Division, N.V.M.A., at Carmarthen, 2 p.m.
Mar. 20th.—Meeting of the North Wales Division, N.V.M.A., at Rhyl, 1.30 p.m.
Apr. 1st.—R.C.V.S. Annual Fees due.
Apr. 16th.—R.C.V.S. Committee Meetings, Hotel Russell, London.
Apr. 17th.—R.C.V.S. Committee and Council Meetings, Hotel Russell, London.
May 11th.—R.C.V.S. Animal Management Examination begins.

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PERSONAL

Their many friends in the profession will be relieved to learn that Mr. W. Gardner, M.R.C.V.S., and Mrs. Gardner, Woodside, Maybole, have received a cablegram from Free Chinese territory that their only son, Mr. Walter J. F. Gardner, was known to be safe and a prisoner of war in Hong Kong. Nothing had been heard of him since November last.

Marriage.—Weedon—Thorne.—On Saturday, February 21st, at St. Mary's, Porchester, David Anthony James Weedon, M.R.C.V.S., son of Mr. and Mrs. Weedon, of Tiverton, Devon, to Margaret Thorne, daughter of Mr. and Mrs. A. J. Thorne, of Porchester, Hants.

* * * * *

R.C.V.S. OBITUARY

Emery, F. W., O.B.E., F.R.C.V.S., Coolattin, Lisburn Road, Balmoral, Belfast. Graduated London, May 17th, 1889; Fellowship, December 12th, 1903. Died February 22nd, 1942.

Irving, Robert Chrystal, F.R.C.V.S., Shenley Lodge, Ridge Hill, nr. Barnet, Herts. Graduated Edinburgh, July 17th, 1884; Fellowship, April 24th, 1889. Died February 25th, 1942; aged 78 years.

Soothill, Philip Lionel, Norland, Woodcote Green, Wallington, Surrey. Graduated London, December 9th, 1939. Died February 15th, 1942.

Mr. F. W. Emery, O.B.E., F.R.C.V.S.

Former Chief Veterinarian, Ministry of Agriculture, Northern Ireland

We announce with deep regret the death of Mr. F. W. Emery, O.B.E., F.R.C.V.S., former Chief Veterinary Officer of the Ministry of Agriculture, which took place at his home, Coolattin, Lisburn Road, Balmoral, Belfast, on Sunday, February 22nd.

Mr. Emery, who retired in 1932, was appointed Veterinary Inspector to the Privy Council in 1889. From 1900 to 1922 he was supervisor of Portal Veterinary Inspection at Belfast under the Department of Agriculture for Ireland, and was then Chief Veterinary Officer to the Imperial Secretary's Department of the British Home Office from 1922 to 1926.

He was President of the North of Ireland Veterinary Medical Association for two years, and for twelve years held the same office in the Veterinary Officers' Association for Ireland.

Thus by the death of Mr. Emery the veterinary profession in Ulster has lost one of its outstanding members. The *Belfast News-Letter* says of him: "His efforts during the tenure of the latter office were largely instrumental in obtaining pension rights for Veterinary Civil Servants in Ireland. He was a member of the Royal Institute of Public Health. Prior to his retirement from the Civil Service he was in sole charge of a serious outbreak of foot-and-mouth disease in Ulster and received widespread praise for the effective way in which he dealt with it."

On his retirement Mr. Emery received the O.B.E., and was presented with an illuminated address and silver from the veterinary profession. He is survived by his wife, three sons and three daughters, to whom widespread sympathy is extended in their bereavement.

Mr. R. Chrystal Irving, F.R.C.V.S.

In the lamented death of Mr. Robert Chrystal Irving, F.R.C.V.S., announced above, a link is severed not only with the golden age of horse practice, as the profession has come to recognise it, but with the early history of this journal, for Mr. Irving, after he left Birmingham, was for twenty years in partnership with the founder of *The Veterinary Record* at Halkin Place, Belgrave Square.

Further tribute will be paid in our next issue, but meantime we may remind our readers of the interesting feature, "A Practitioner's Reflections," contributed by Mr. Irving to our Jubilee issue (July 16th, 1938), as illustrating his progressive outlook on all things pertaining to his profession. Therein he took occasion to welcome unreservedly the entry of women in increasing numbers—an attitude by no means commonly adopted amongst those of his fellow "veterinarians of the old school" who had earned, with him, notable reputations in the field of equine practice.

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Roll of Honour

Pilot Officer Philip L. Soothill, M.R.C.V.S.

His former colleagues at the Royal Veterinary College, from which he graduated so recently, will learn with sorrow that Philip L. Soothill, who was a Pilot Officer in the R.A.F. Volunteer Reserve, lost his life as the result of an aircraft accident on February 16th. His was a fine young life at the outset of a useful career, and all will mourn the loss under such tragic circumstances of a member of the profession who was an enthusiast in his work, but determined above all to do his duty to his country. To the bereaved parents and Pilot Officer Soothill's brother and sister we extend our sincerest sympathy.

The Late Mr. W. J. McCubbin, M.R.C.V.S.

A Tribute

In connection with the death of Mr. William John McCubbin, Veterinary Officer, Negri Sembilan, Malaya, who, as announced in our issue of February 21st, lost his life at Singapore during the period of enemy engagement, Mr. N. Robert Turnbull, M.R.C.V.S., of Basingstoke, writes as follows: "The contemporaries of W. J. McCubbin will, I am sure, have read of his untimely passing with profound sorrow. His genial personality assured his popularity among all with whom he came in contact.

"It is natural for me to recall "Mac's" college career as his post-graduate work carried him far from his home and old associations. His all-round ability at work and sport, together with his tireless energy, qualified him for his position as President of the Union Society and Secretary of the V.M.A. of the London College. All those who were in close contact with him at that time will remember the tact and understanding with which he handled many a difficult situation.

"I am sure I express the feeling of all who were privileged to be his friends when I extend the deepest sympathy to his parents in their irreparable loss."

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The Late Mr. J. Forsyth Rees, M.R.C.V.S.

Mr. John Forsyth Rees, M.R.C.V.S., whose death we recorded with deep regret in our last issue, was one of the best-known practitioners in West Wales. A native of Llanboidy, Mr. Rees had conducted an extensive practice at Carmarthen for upwards of fifty years.

The Carmarthen Journal says of him: "Skilled in his profession, his services were in much demand over a wide area, and his passing is a distinct loss to the agricultural community. Mr. Rees took an active interest in farming affairs, and all movements for the advancement of the country's oldest industry found in him a staunch supporter. He served on the Council of the United Counties' Agricultural Society and on the committee of the United Counties Hunters' Society. He was also a member of the Carmarthenshire Hunt, and was a popular figure, not only in the hunting field, but also at the annual point-to-point races. Here, as at the annual exhibitions of the Agricultural and Hunters' Societies, he rendered invaluable

service as an honorary official. When the Royal Welsh Agricultural Show was held at Carmarthen in 1925 Mr. Rees was a prominent member of the local Executive Committee and contributed his quota towards the unprecedented success which attended this memorable event. He was a keen judge of horses, and his thoroughbreds captured many premiums at the Light Horse Society's exhibitions at the Agricultural Hall, Islington. He was also interested in the Carmarthenshire Shire Horse Society and the Carmarthenshire Chamber of Agriculture. Mr. Rees was a member of Christ Church, Carmarthen, and in politics was a Conservative. His business acumen and personal charm were among the qualities which won for him a host of friends."

Mrs. Rees, a Carmarthen lady, predeceased him about twelve years ago, and he is survived by a son, Dr. George Forsyth Rees, an officer in the Royal Air Force, and a daughter, Mrs. T. H. Phillips, of Usk, with whom much sympathy is felt, also with his two sisters, the Misses B. and K. Rees, who have resided with him during the past few years.

The funeral took place on February 19th and interment at Carmarthen Cemetery was preceded by a service at Christ Church. The following members of the veterinary profession attended: Mr. A. D. J. Brennan (President of the South Wales Division, N.V.M.A.), Messrs. John Evans, Llanelly; Denzil Evans, Carmarthen; W. Davies, Llandyssul; D. J. Davies, Newcastle Emlyn; — Davies, Llanelly; T. H. Jones, Llandilo; K. J. Mackay, Llanelly; J. P. Simpson, Carmarthen, and T. R. Thomas, Carmarthen.

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CONTROL OF SWINE FEVER

The National Farmers' Union Diseases of Animals Committee is not to proceed with its proposed scheme for an insurance slaughter policy for swine fever.

At a recently-held meeting of the national council of the Union it was agreed that consideration should be deferred until the results of the Ministry of Agriculture's crystal violet vaccine experiments were available.

* * * * *

Weekly Wisdom

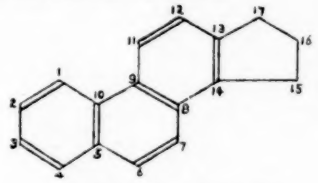
Many a scientist has patiently designed experiments for the purpose *of substantiating his belief that animal operations are motivated by no purposes. He has perhaps spent his spare time in writing articles to prove that human beings are as other animals so that "purpose" is a category irrelevant for the explanation of their bodily activities, his own included. Scientists animated by the purpose of proving that they are purposeless constitute an interesting subject for study.*—Professor A. N. Whitehead. Quoted in "The Miraculous Birth of Language" by R. A. Wilson. Preface by Bernard Shaw. (Guild Books.)

* * * * *

CHEMISTRY OF THE OESTROGENS

"The chemistry of the steroid hormones looks and sounds too complicated for the medical man, but as the years go by and these substances are more and more widely used some idea of the chemical nature and relations of the various compounds now available should be useful," states *The British Medical Journal* in its main leading article of January 10th. "Recently the steps leading to the isolation or discovery of the natural and synthetic oestrogens, and the proof of their formulae, have been reviewed by Doisy[1] and by Dodds[2] respectively. Memories of the organic chemistry learnt in pre-clinical years are generally hazy, but most of us can recall the straight chain (aliphatic) hydrocarbons—methane, ethane, etc.—and probably it does not tax us too much to recall that the sixth member of this group (hexane, C_6H_{14}) can be converted into a hexagonal ring structure or aromatic compound, and that in saturated hydrocarbons all the available valencies, apart from those joining the neighbouring carbon atoms in the chain, are taken up by hydrogen atoms. If two hydrogen atoms are removed from neighbouring carbon atoms these two carbons are now linked by a double bond and the molecule is said to be unsaturated. An unsaturated compound is referred to by the suffix *-ene*, so that according to the number of double bonds in the hexane ring, or *cyclo*-hexane, one may have *cyclo*-hexene, -hexadiene, and -hexatriene. *Cyclo*-hexatriene is more widely known under the familiar name of benzene, and in view of what follows it should be remembered that if a hydroxy group is attached to the benzene ring phenol is obtained.

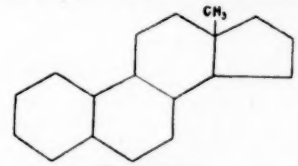
"So much for the basic units from which are built up the complex steroid molecules. Fortunately all the sterols also have a readily understood basic unit—the *cyclo*-pentenophenanthrene ring, which is illustrated in Formula I.



I. *Cyclo*-pentenophenanthrene

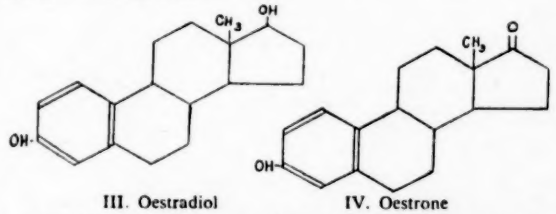
It has a four-ringed (tetra-cyclic) structure consisting of three benzene rings (phenanthrene) with one *cyclo*-pentane ring attached; as, however, this latter ring is attached to its benzene ring along a double bond it becomes a *cyclo*-pentene ring. The numbers of the more important carbon atoms are also indicated. This is the basic structure for the hormones of the testis and adrenals as well as for those of the ovary—the difference between these three (or, including progesterone, four) groups of hormones lies in the degree of saturation and in the attached methyl groups.

"Oestrane (II), which is the name given to the parent compound of the natural oestrogens, is a completely saturated form of *cyclo*-pentenophenanthrene with a methyl group attached to the carbon atom numbered 13. While it is not essential that the actual chemical nomenclature should be known, it may be interesting to work out the structure from the chemical name, so the following rules may be found useful. Δ with a number or numbers with it indicates the actual position of the double



II. Oestrane

bonds in a compound, while the suffixes *-ol* and *-one* indicate -hydroxy and -ketone derivatives. The prefixes *cis-* and *trans-* are also encountered, and indicate different isomeric forms due to the presence of an asymmetric carbon atom (17 in the case of oestradiol). The three oestrogens so far isolated from human tissue or urine, commonly known as oestradiol, oestrone, and oestriol, can thus be referred to chemically as $\Delta^{1\,3\,5}$-oestratriene-3, 17-*trans*-diol; $\Delta^{1\,3\,5}$-oestratriene-3-ol-17-one; and $\Delta^{1\,3\,5}$-oestratriene-3, 16, 17-triol. The structural formulae of oestradiol (III) and oestrone (IV) are illustrated, and comparison with the chemical names should make the principles of the nomenclature clear.

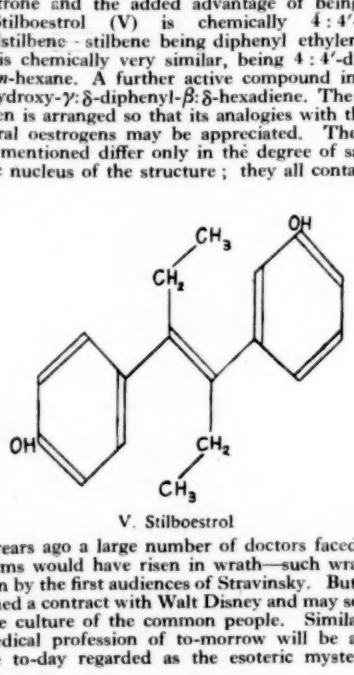


III. Oestradiol IV. Oestrone

"All these three oestrogens have been isolated from human urine in pregnancy and from placenta, but only oestrone and oestradiol have so far been obtained from ovarian tissue. The difficulties in such extractions are emphasised by the fact that only about 6 mg. of each substance were obtained from 1 ton of sows' ovary. Other oestrogens obtained from animal sources are equilenin and equilin, both obtained from the urine of pregnant mares. The former is of theoretic importance—it is

$\Delta^{1\,3\,5\,5\,8}$-oestrapentene-3-ol-17-one, being thus structurally the same as oestrone except that there are two more unsaturated linkages in the molecule. It is important as the first natural oestrogen to be formed symthetically in the laboratory from a relatively simple compound. This was achieved by Bachmann and his colleagues[3] in 1939, using 1-naphthylamine 6-sulphonic acid (which even sounds fairly simple) as their starting material. This work clinched the arguments—previously based on indirect chemical evidence—as to the structure of the oestrogenic hormones. Equilenin had already been converted into oestrone *in vitro* by Marker,[4] and both oestradiol and oestriol may be similarly converted by dehydrogenation. Another point to be noted is that all the natural oestrogens are phenolic—that is, the A ring (carbon atoms 1-5) is a phenol ring, which enables them to be separated from the other sex hormones by their solubility in aqueous alkali. They may then be precipitated by using petrol ether, in which, compared with other lipins, they are relatively insoluble. This procedure is the basis of the quantitative fractionation of urinary hormones, which has been proceeding rapidly in recent years.

"The commercial preparation of the natural oestrogens has chiefly depended on the collection of large volumes of the urine of pregnant mares, and it is clear that such a procedure, together with the fairly complex isolation of the pure substances from the urine, has accounted for the high cost of the products. This is one of the main factors in the practical importance of the synthetic oestrogens. It is now eight years since Dodds and his colleagues showed that 1 : 2 : 3 : 4-tetrahydrophenanthrene had oestrogenic properties, though to produce the same results as the natural oestrogens nearly a million times the dose had to be injected. Later, however, they showed that a dihydroxy-dipropyl-dihydro-dibenzanthracene had oestrogenic activity which was approaching that of the naturally occurring hormones. These compounds had ring structures in some degree similar to those of oestrone, and it was not until 1936 that Dodds and Lawson showed that the phenanthrene ring structure was not essential for the production of oestrus in experimental animals. The process of simplification of the molecule while still obtaining oestrogenic activity reached its culmination in the discovery of stilboestrol and hexoestrol, which have potency at least equal to that of oestrone and the added advantage of being active by mouth. Stilboestrol (V) is chemically 4 : 4′-dihydroxy-α : β-diethylstilbene - stilbene being diphenyl ethylene (ethene). Hexoestrol is chemically very similar, being 4 : 4′-dihydroxy-γ: δ-diphenyl-*n*-hexane. A further active compound in this series is 4 : 4′-dihydroxy-γ:δ-diphenyl-β:δ-hexadiene. The stilboestrol formula given is arranged so that its analogies with the formulae of the natural oestrogens may be appreciated. The other two compounds mentioned differ only in the degree of saturation of the aliphatic nucleus of the structure; they all contain phenolic properties.



V. Stilboestrol

"A few years ago a large number of doctors faced with such chemical terms would have risen in wrath—such wrath perhaps as that shown by the first audiences of Stravinsky. But Stravinsky has now signed a contract with Walt Disney and may soon become a part of the culture of the common people. Similarly we feel that the medical profession of to-morrow will be acclimatised to what are to-day regarded as the esoteric mysteries of the chemist."

[1] *J. Amer. med. Ass.*, 1941, **116**, 501.
[2] *Edinb. med. J.*, 1941, **48**, 1.
[3] *J. Amer. chem. Soc.*, 1939, **61**, 974.
[4] *J. Amer. chem. Soc.* 1938, **60**, 1897.

ARMY VETERINARY SERVICES

The following notifications are made in the issue of *The London Gazette* dated February 17th, 1942:—

Col. (temp. Brig.) C. A. Murray (late R.A.V.C.), on completion of tenure of service as Col., remains on full pay (supernumerary) December 1st, 1941.

ROYAL ARMY VETERINARY CORPS

Gnr. William Blanshard from R.A., to be Lieut., January 24th, 1942.

* * * * *

"Animal Husbandry in India" is the subject of a paper to be presented by Sir Arthur Olver, Principal of the Royal (Dick) Veterinary College and formerly Animal Husbandry Expert to the Government of India, to the Royal Society of Arts, India and Burma Section, at John Adam Street, Adelphi, W.C.2, on Friday, March 13th, at 1.45 p.m. Sir Frank Noyce will preside.

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Mr. Lindsay Auchterlonie, M.R.C.V.S., of Nottingham, writes: "Some time ago I asked you to publish a notice in regard to the application for extra supplementary petrol. In this notice I requested that such applications should be received by me no later than the first post on Tuesday mornings for action during the ensuing week. Veterinary surgeons will realise that as personal application is made to the D.P.O. and my practice does not allow much of my time being devoted to this office, I cannot visit the D.P.O. on more than one occasion in the week. I would like to say that although I am most anxious to help I cannot make further visits during the week."

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue. *The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.*

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MODE OF INFECTION WITH ACTINOMYCES

TO THE EDITOR OF THE VETERINARY RECORD

Sir,—I have read with interest "Mode of Infection with Actinomyces" in your February 21st edition of *The Veterinary Record*.

To my mind, Bostroem's observations still hold good.

Several years ago, one of my clients, a farmer, visited my surgery just after he had had advice from his doctor concerning a swelling in his face. A day or so later the doctor lanced the affected part but found it very hard.

This swelling increased and it was deemed advisable to send the patient to hospital, where it was found, from a swab of the affected man, that the patient was suffering from actinomycosis. The farmer then stated that he had felt an awn pierce his cheek while he was working in a field of barley, and later irritation and swelling followed.

Does not this incident show that the infection was carried by an awn and thus furnish convincing evidence of the soundness of Bostroem's theory?

Yours faithfully,

February 24th, 1942. "INTERESTED."

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"TO WHOM HONOUR IS DUE"

TO THE EDITOR OF THE VETERINARY RECORD

Sir,—I read with considerable interest Mr. Lancaster's letter published in *The Veterinary Record* of February 28th.

Dr. Hare's opinions voiced at the various meetings are his sincere convictions and it is a very good thing that we have men like him who are not afraid to air their views, even if we do not agree with them.

The individuals mentioned in Mr. Lancaster's letter are all personal friends of mine and I have the highest respect for them, but there are others who did yeoman service for the "National" years ago. Possibly if it had not been for their efforts there would be no "National" to-day.

We all know that the Survey scheme is good in parts, but why should it be suggested that a few men receive special honours?

Yours faithfully,

10, Walsingham Road, H. SCOTT DUNN.
Hove 3, Sussex.
February 28th, 1942.